

Fire Research Report: The British Oxygen Company Limited,  
150 Polmadie Road, Glasgow, G5

Item 1. Details of Call

Date: Monday, 7th February, 1977  
Time and method of call: 1035. Exchange telephone  
Address: 150 Polmadie Road, Glasgow, G5

Item 2. Trade or Business

Production and distribution of Medical and Industrial Gases.  
Bulk Liquid Petroleum Gas Storage Terminal.

Item 3. Fire Brigade Appliances and personnel in attendance

Water tender/ladders	19
Hydraulic platform/pump	1
Turntable ladders	3
Emergency tenders	1
Breathing apparatus tenders	1
High expansion foam unit	1
Control unit	1
Staff cars	12

Total number of personnel - 133 (Whole time).

Item 4. Other services requested and in attendance

Strathclyde Region Police  
Ambulance Services  
Glasgow Salvage Corps.  
Water Authority  
British Rail Services.

Item 5. Particulars of Property involved

- (a) A 15 ton capacity Liquefied Petroleum Gas articulated road tanker, Registration number:- WNN 406H.
- (b) Liquefied Petroleum Gas bulk storage terminal consisting of 4 x 100 tons capacity cylindrical welded steel tanks with hemi-spherical ends, measuring 76 feet in length by 12 feet in diameter.

Item 6. Immediately available water supplies and fixed installations

- (a) Public hydrants at Polmadie Road.  
3 hydrants off a 6 inch main each with a static pressure of 50/55 PSI and providing a total of approximately 500 GPM.  
1 hydrant off a 9 inch main with a static pressure of 50 PSI and providing 340 GPM.
- (b) Private hydrants within the plant.  
6 hydrants off a 6 inch main each with a static pressure of 50/55 PSI and each capable of providing between 250 and 310 GPM.
- (c) Static supplies within the plant.

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60,000 gallons of water provided specifically for the drencher system covering the Liquefied Petroleum Gas bulk storage, the concrete apron for loading or offloading road tankers and the rail spur from which bulk supplies of Liquefied Petroleum Gas are delivered and pumped into the storage tanks.

The whole system is brought into operation when any one of the fire alarm actuation points in the vicinity of the plant are operated. This automatically brings into operation two pumps providing 1500 GPM each and one pump providing 1200 GPM.

The power supply of electricity to these pumps is duplicated by two separate South of Scotland Electricity Board feeders which enter the plant site.

Water is continually recirculated by concrete gulleys back to a sump connected to the static supply.

Item 6. Supposed Cause of Fire

Failure of the Liquefied Petroleum Gas delivery hose, connected from the tanker to the inlet leading to a remotely sited 54 ton capacity Liquefied Petroleum Gas tank. This caused a massive leak of liquid propane, which vapourised and became ignited possibly by the vehicle exhaust system, the vehicle electric system or by static electricity caused by failure to connect earthing strips.

Item 7. General Description of Incident

The tanker belonging to Calor Gas Limited, Grangemouth, carrying a full 15 ton capacity load of liquid propane arrived at British Oxygen Company Limited plant some time before 1030 on the day of the occurrence.

To discharge the propane into the 54 ton capacity Liquefied Petroleum Gas Storage tank it has to be sited on the concrete apron immediately in front of and at right angles to the 4 x 100 tons capacity Liquefied Petroleum Gas storage tanks.

The inlet leading to the remotely sited 54 ton capacity storage tank is located almost immediately below No. 4 storage tank, the tanks being numbered from left to right. (See attached sketch).

The reinforced rubber discharge hose would appear to be left permanently connected to the inlet valve. The driver of the tanker, in the presence of an employee of British Oxygen Company, connected the hose to the V thread outlet valve of the tanker, opened the valve and had to immediately close it again due to leakage. The hose coupling was removed, reseated and the valve opened. The tanker pump, powered by the road engine was engaged and liquid propane was observed by the British Oxygen Company employee to be flowing through the now pulsating hose. The British Oxygen Company employee proceeded to the meter located near the 54 ton storage tank to take a reading. Before reading the meter, he heard a bang, turned and saw a cloud of vapour enveloping the tanker and traction unit, this was followed almost immediately by ignition. The time as approximated 1034.

At 1035 the first call by exchange telephone was made to the Fire Brigade.

At 1036 the fire alarm actuation point near to the incident was operated, the call being received by auto-alarm connection to the Fire Brigade. Actuation of the alarm immediately brought into operation the fixed installation drencher system.

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The system failed at one vital point. The 'V' threaded blank cap of the three inch water pipe located below No.4 storage tank, immediately above the inlet valve to the 54 ton storage tank had either been left off or was so loosely connected that the force of water along the pipe dislodged it. The impinging jets served by this pipe therefore failed to function properly the water flowing freely from the end of the three inch pipe.

The gas flame from the tanker, partially impeded by the fifteen inch dwarf wall around the installation, enveloped the traction unit, the remainder of the flame impinging on to the lower end of No.4 storage tank and fifty feet along the lower left bottom of the tank. It also enveloped ancillary pipework and valves between Numbers 3 and 4 storage tanks.

The cooling effect of the water spray being lost at this vital point, the pressure inside No.4 storage tank gradually increased to between 210/250 p.s.i.

At 1110 hours the spring loaded pressure relief valve system on top of No.4 storage tank operated and the released gas ignited.

There was a total of twenty pumps attending the incident, most of which were required to provide the manpower to set up the necessary water supplies to feed the twelve ground monitors and two jets in use.

At approximately 1215 hours the flame from No.4 tank relief valve started to diminish due to the effect of the cooling jets and by 1220 hours the relief valve had re-seated and the flame extinguished itself.

The fire was now confined to gas leakage through the flanges of ancillary pipework below No.4 storage tank. This fire was extinguished when the supply of liquefied petroleum gas was shut off by a Fire Brigade officer who, working under cover of protecting jets, closed the outlet valve on the road tanker.

At 1230 Depty Firemaster Harper stopped mobilisation.

As a precautionary measure, and with the exception of personnel directly involved with the incident, all persons within a radius of 1,000 yards were evacuated under the direction of the police. This included evacuation of schools, dwelling houses, industrial and commercial premises.

Item 8. Method of Extinguishing Fire.

Cooling of tanks by two (2) jets and six (6) ground monitor jets through six (6) pumps and water from fixed installation, until pressure in No.4 tank had sufficiently reduced to allow safety valve to close and extinguish fire at valve. Remaining fire from gas leaks at damaged pipe flanges under No.4 tank extinguished by Fire Service Officer closing valve of road tanker working under cover of projecting jets.

Item 9. Description of Damage.

Road tanker traction unit destroyed.  
Approximately 55 tons of propane destroyed.  
Metal stair and walkway over the tanks distorted by heat.  
Ancillary pipework of installation damaged by heat.  
Slight heat damage to 2 x 100 ton capacity storage tanks.

Item 10. Casualties. /



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Neil Fullerton, male, aged 40 years (tanker driver)  
Superficial burns to hands, face and neck.  
Released from hospital after treatment.

Item 11. Unusual Features

1. Partial failure of drencher system.
2. Possible lack of care and maintenance of the reinforced rubber discharge hose.
3. Possible failure to connect earthing strips between the tanker and the plant.
4. Lack of precise information as to exactly what was involved in the incident (from Plant Management). It was not until some time after the incident that the Fire Brigade learned that the connections between the road tanker and plant in no way involved the 100 tons capacity storage tanks.
5. The siting position of road tankers receiving or delivering propane. It was precisely this which caused No. 4 storage tank to be involved in fire.

Item 12. General Information

The Liquid Petroleum Gas bulk storage terminal was commissioned by the British Oxygen Company Limited on the 13th January, 1969.

Prior to this date the British Oxygen Company Limited undertook many consultations and meetings both with Glasgow Fire Service and HM Factory Inspectorate.

The Firemaster of Glasgow objected in principal to the proposed bulk storage of liquefied petroleum gas this being recorded in a letter dated the 22nd July, 1968. The reasons for this objection were the close proximity of residential and industrial property and to the hazards already existing within the plant.

This was duly recorded in the minutes of the meeting, which was held on the 10th July, 1968, by the British Oxygen Company, a copy of the minutes being sent to the Firemaster. Also recorded in these minutes was reference to the need for planning permission.

It had been ascertained by the British Oxygen Company, in answer to a question put by Glasgow Fire Service, that planning permission was not required for any part of the installation except for the pump house.

It should nevertheless be emphasised that the British Oxygen Company did co-operate fully with requests and advice given by Glasgow Fire Service in the construction and provision of safety devices to the plant.

With regard to the incident outlined in this report, it is felt that a serious situation developed due to the close proximity of the road tanker to the ends of the four storage tanks.

The tanker was parked about 15 feet from the ends of the storage tanks with outlets from the tanker facing the ends of the storage tanks. Had the road tanker off-loading point been remote from any storage tanks or had the road tanker been parked in such a manner that the delivery valves were facing away from the storage tanks, then the incident would most probably have been confined to a fire involving the road tanker and its contents only.

SCHOOL

HOUSING.

CRETE FENCE 2 METERS HIGH

KILBRIDE ST.

STRATHCLYDE FIRE DC

B DIVISION

REF B/WFM

DATE OF INCIDENT -

7-2-77.

